

ABSTRACT

The present invention describes catalysts for atom transfer radical polymerization processes. Specifically, a hybrid catalyst system comprising transition metal complexes held in close conjunction with a solid support and of a soluble ligand, or soluble transition metal complex or desorbed catalyst. The hybrid catalyst system may be used in a controlled polymerization process of radically (co)polymerizable monomers in the presence of a system comprising an initiator comprising one or more radically transferable atom(s) or group(s). The catalyst may include a transition metal, one or more counterions, a ligand attached to a solid support, and a soluble ligand. The hybrid catalyst may also be comprised of an attached transition metal complex, and a soluble transition metal complex. The ligand or the transition metal complex may be physico- or physicochemically or chemically bound to the surface of a solid support through ionic bonding, physisorption, chemisorption, Van der Waals forces, coordinate or covalent bonding. A process for the removal and recycle of a supported transition metal catalyst complex from a polymerization reaction medium is also described.